

CLAIMS

1. Electric cable (10; 20; 30) comprising a conductor (1) and an insulating coating (2; 21; 31) surrounding said conductor (1), said insulating coating (2; 21; 31) having a predetermined thickness and comprising at least two insulating layers (3; 4; 5), characterized in that, in a radial direction from the inside towards the outside of said electrical cable (10; 20; 30), said insulating layers (3; 4; 5) comprise:
 - a. at least one insulating layer (3) made of a non-expanded polymeric material, and
 - b. at least one insulating layer (4; 5) made of an expanded polymeric material,said at least one insulating layer (4; 5) made of an expanded polymeric material being integral with said at least one insulating layer (3) made of a non-expanded polymeric material.
2. Electric cable (10; 20; 30) according to Claim 1, wherein the thickness of said at least one insulating layer (3) made of a non-expanded polymeric material is at least half of said predetermined thickness of said insulating coating (2; 21; 31).
3. Electric cable (10; 20; 30) according to Claim 2, wherein the thickness of said at least one insulating layer (3) made of a non-expanded polymeric material is not lower than 70% of said predetermined thickness of said insulating coating (2; 21; 31).
4. Electric cable (10; 20; 30) according to Claim 3, wherein the thickness of said at least one insulating layer (3) made of a non-expanded polymeric material is not lower than 85% of said

predetermined thickness of said insulating coating (2; 21; 31).

5. Electric cable (10; 20; 30) according to Claim 1, wherein said at least one insulating layer (4; 5) made of an expanded polymeric material is bonded with said at least one insulating layer (3) made of a non-expanded polymeric material.
6. Electric cable (10; 20; 30) according to Claim 1, wherein said at least one insulating layer (4; 5) made of an expanded polymeric material is co-extruded with said at least one insulating layer (3) made of a non-expanded polymeric material.
7. Electric cable (10; 20; 30) according to Claim 1, wherein said at least one insulating layer (3) made of a non-expanded polymeric material adheres to said at least one conductor (1).
8. Electric cable (20) according to Claim 1, wherein said at least one insulating layer (5) made of an expanded polymeric material of said insulating coating (21) is an intermediate layer between an inner insulating layer (3) made of a non-expanded polymeric material and an external insulating layer (4) made of an expanded polymeric material.
9. Electric cable (30) according to Claim 1, wherein said at least one insulating layer (5) made of an expanded polymeric material of said insulating coating (31) is an intermediate layer between an inner insulating layer (3) made of a non-expanded polymeric material and an external insulating layer (4) made of a non-expanded polymeric material.
10. Electric cable (20; 30) according to Claim 8 or 9, wherein said intermediate insulating layer (5) is circumferentially non-continuous in the cross section.

11. Electric cable (20; 30) according to Claim 10, wherein said intermediate insulating layer (5) presents at least one interruption.
- 5 12. Electric cable (20; 30) according to Claim 11, wherein said at least one interruption is located along the external profile of said inner insulating layer (3).
- 10 13. Electric cable (20; 30) according to Claim 10, wherein said at least one interruption is located in proximity of the external profile of said inner insulating layer (3).
- 15 14. Electric cable (20; 30) according to Claim 10, wherein said circumferentially non-continuous intermediate insulating layer (5) comprises at least one semicircular sector.
- 15 15. Electric cable (20; 30) according to Claim 14, wherein said at least one semicircular sector is provided within said inner insulating layer (3).
- 20 16. Electric cable (20; 30) according to Claim 14, wherein said at least one semicircular sector is provided within said external insulating layer (4).
- 20 17. Electric cable (20; 30) according to Claim 8 or 9, wherein said intermediate insulating layer (5) is circumferentially continuous in the cross section.
- 25 18. Electric cable (10; 20; 30) according to Claim 1, wherein said expanded polymeric material is obtained from a polymeric material that, before expansion, has a flexural modulus at room temperature, measured according to ASTM Standard D790, comprised between 30 20 MPa and 600 MPa.
19. Electric cable (10; 20; 30) according to Claim 18, wherein said flexural modulus is not greater than 200 MPa.

20. Electric cable (10; 20; 30) according to Claim 19, wherein said flexural modulus is comprised between 20 MPa and 200 MPa.
- 5 21. Electric cable (10; 20; 30) according to Claim 20, wherein said flexural modulus is comprised between 10 MPa and 150 MPa.
- 10 22. Electric cable (10; 20; 30) according to Claim 1, wherein the polymeric material of said at least one insulating layer (4; 5) is an expandable polymer selected from the group comprising: polyolefins, copolymers of various olefins, olefins/unsaturated esters copolymers, polyesters, and their mixtures.
- 15 23. Electric cable (10; 20; 30) according to Claim 22, wherein said expandable polymer is polyvinyl chloride.
- 20 24. Electric cable (10; 20; 30) according to Claim 1, wherein said at least one insulating layer (3) made of a non-expanded polymeric material and said at least one insulating layer (4; 5) made of an expanded polymeric material are made of the same base polymeric material.
- 25 25. Electric cable (10; 20; 30) according to Claim 1, wherein said at least one insulating layer (4; 5) made of an expanded polymeric material has an expansion degree comprised between 2% and 500%.
26. Electric cable (10; 20; 30) according to Claim 25, wherein said expansion degree is comprised between 5% and 200%.
- 30 27. Electric cable (10; 20; 30) according to Claim 26, wherein said expansion degree is comprised between 10% and 50%.
28. Electric cable (10; 20; 30) according to Claim 1, wherein said at least two insulating layers (3; 4; 5) of said insulating coating (2; 21; 31) present an

insulating constant (k_i) greater than 750 MOhm*km at 20°C.

29. Electric cable (10; 20; 30) according to Claim 1, wherein said at least two insulating layers (3; 4; 5) of said insulating coating (2; 21; 31) present an insulating constant (k_i) greater than 0.3 MOhm*km at 70°C.
30. Electric cable (10; 20) according to Claim 1, wherein said at least one insulating layer (4) made of an expanded polymeric material has a thickness comprised between 0.05 mm and 1.00 mm.
31. Electric cable (10; 20) according to Claim 30, wherein the thickness of said at least one insulating layer (4) made of an expanded polymeric material is comprised between 0.10 mm and 0.50 mm.
32. Process for manufacturing an electric cable (10; 20; 30), said cable (10; 20; 30) comprising a conductor (1) and an insulating coating (2; 21; 31) surrounding said conductor (1) and comprising, in a radial direction from the inside towards the outside of said electrical cable (10; 20; 30), at least one insulating layer (3) made of a non-expanded polymeric material and at least one insulating layer (4; 5) made of an expanded polymeric material, said process comprising the steps of:
- feeding said conductor (1) to an extruding machine;
 - depositing by co-extrusion:
 - a non-expandable polymeric material in a position radially external to said conductor (1) so as to form said at least one insulating layer (3) made of a non-expanded polymeric material;

an expandable polymeric material in a position radially external to said at least one insulating layer (3) made of a non-expanded polymeric material so as to form said at least one insulating layer (4; 5) made of an expanded polymeric material;

- expanding said expandable polymeric material during said step of depositing by co-extrusion.

33. Process according to Claim 32, wherein said step of expanding is effected during said step of depositing by co-extrusion by adding an expanding agent.

34. Process according to Claim 33, wherein said step of expanding is effected during said step of depositing by co-extrusion by injecting a gas at high pressure.